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SHORT COMMUNICATION

HIGHER ORGANIZED SPOROPOLLENIN BIOPOLYMER STRUCTURES AND THE EXPLOSION OF THE POLLEN GRAINS UNDER SCANNING EFFECT

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The first TEM pictures on the higher organized globular biopolymer units of the sporopollenin were first published in 1974 (KEDVES et al.). This structure was surprising in contrast to the fibrillar or lamellar concepts of the plant cell wall, and was criticized by ROWLEY and PRIJANTO (1977). Later helical substructures of the exine were described in several papers by ROWLEY et al., e.g.: 1981. SOUTHWORTH (1985) by acetolysis and hot 2-aminoethanol method re-discovered the granular sub-units of the exine of *Lilium longiflorum*, and established that "the granules are arranged in irregular pentagons", p. 1274. It was written that the exine consists of materials of three solubility and a new model of the exine substructure was published, where the system of polygons were surrounded by interconnected granules. During our new experimental studies with the *Helix* enzyme (KEDVES, 1986a,b) the globular biopolymer units were again described from the wall of recent *Corylus avellana* L. and fossil *Botryococcus braunii* KÜTZ. from the oil shale of Hungary. Later my new experiments with a modified method of 2-aminoethanol and $KMnO_4$ resulted in a very characteristic pentagonal polygon biopolymer structure (Fig. 1—3), on the exine of *Taxus baccata* L. The ultrastructure of the endexine of this species without degradation is characteristically lamellar. The higher organized biopolymer units are composed from globular base units, which are connected with short arms, cf. SOUTHWORTH (1985, 1986), well shown in Fig. 2. This structure is similar to a crystalline organisation. Probably this biopolymer organisation may explain the explosion of the pollen grains under "scanning effect" on high acceleration voltage. The acceleration of the pollen grains may deform this polygonal structures, and this is the cause of the explosion. In all probability, the arms will be broken and the collapse of the globular units liberate a relatively high energy. This is the reason why the place of the explosion, the gold-palladium and the adhesive have been evaporated (KEDVES 1986c, p. 208, Fig. 1). Since the biopolymer units of the wall of the *Botryococcus* algue from the oil shale are similar to those of the pollen exines, it may be hoped that with a rentable technology the oil shale can be a new energy basis, by the liberation of the binding energy of the wall biopolymer structure.

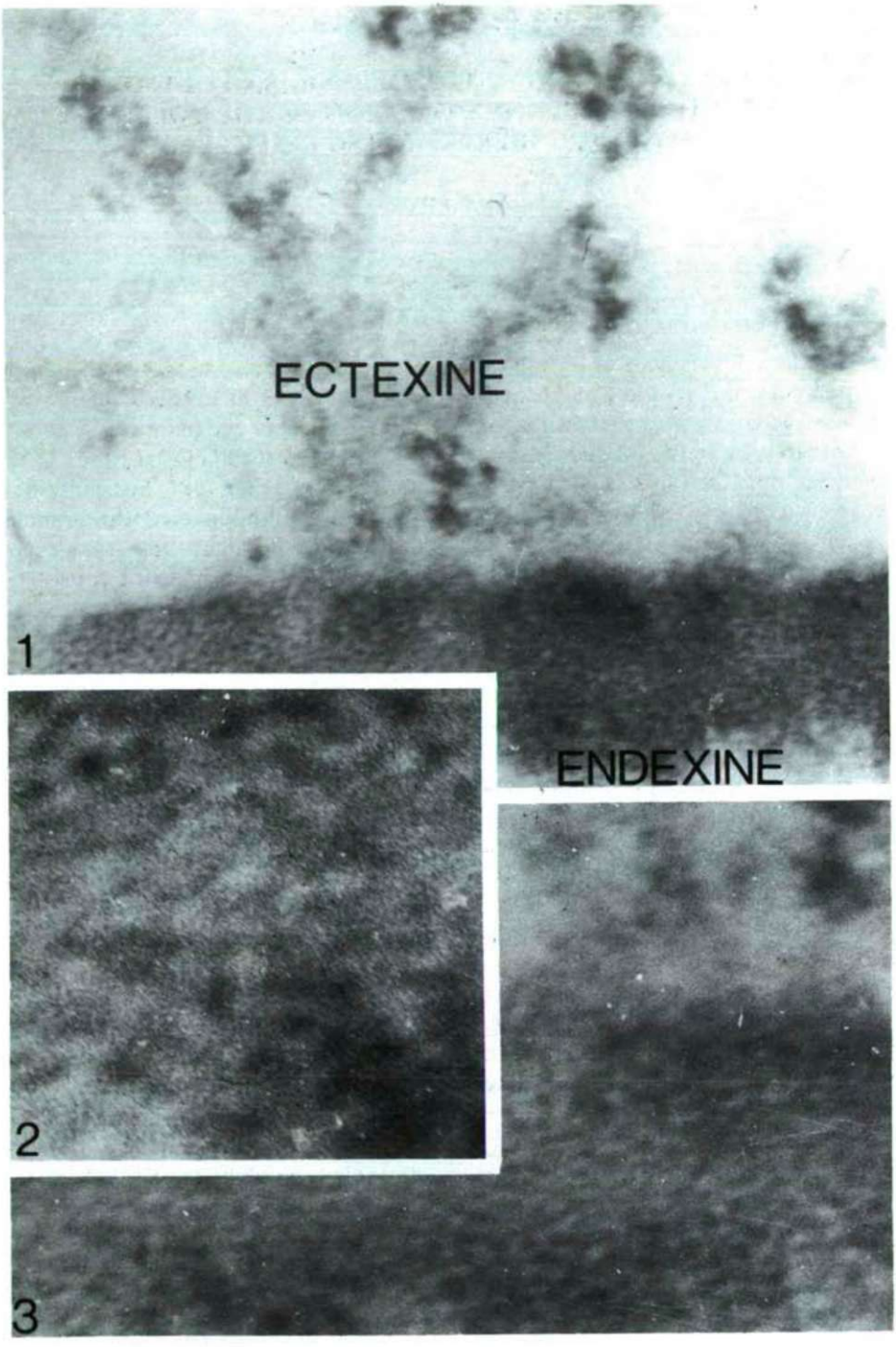
ECTEXINE
1
ENDEXINE
2
3

Fig. 1—3.
Taxus baccata L., partially degraded exine (20 mg air dried pollen grains + 1 ml 2-aminoethanol, temperature 24 °C, length of time 24^h. + 10 ml $KMnO_4$ 1%, temperature 24 oC, length of time 12h).
1. x250000, 2. x1 million, 3. x500000.

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